What is claimed is:

1. A processing device, comprising:

a processing chamber;

a shower head structure, installed at a ceiling portion of the processing chamber, having a plurality of gas jetting holes formed on a gas jetting surface to inject a processing gas into the processing chamber, the gas jetting surface facing toward an inside of the processing chamber; and

a mounting table installed in the processing chamber to face toward the shower head structure,

wherein a head distance between the gas jetting surface and the mounting table and a gas jetting velocity from the gas jetting holes are restricted to be within an area in a plane coordinates system having the head distance as a horizontal axis and the gas jetting velocity as a vertical axis, the area being surrounded by a quadrilateral shape formed by straight lines connecting four points including a point where the gas jetting velocity is 32 m/sec and the head distance is 15 mm; a point where the gas jetting velocity is 67 m/sec and the head distance is 15 mm; a point where the gas jetting velocity is 40 m/sec and the head distance is 77 mm; and a point where the gas jetting velocity is 113 m/sec and the head distance is 77 mm.

2. The device of claim 1, wherein the gas jetting holes of the gas jetting surface is formed in a forming area of a circular shape and an object to be processed loaded on the mounting table is also formed of a circular shape.

3. The device of claim 2, wherein a diameter of the forming area of the gas jetting holes in the gas jetting surface is set to be equal to or smaller than a diameter of the object to be processed.

4. The device of claim 3, wherein the diameter of the forming area of the gas jetting holes in the gas jetting surface is 70% to 100% of the diameter of the object to be processed.

5. The device of one of claims 1 to 4, wherein the processing gas contains ozone for reforming a metal oxide film formed on a surface of the to-be-processed object.

6. The device of claim 5, wherein the metal oxide film is a tantalum oxide film.

7. A processing method for processing an object to be processed by using a processing apparatus including a processing chamber; a shower head structure, installed at a

ceiling portion of the processing chamber, having a plurality of gas jetting holes formed on a gas jetting surface thereof to inject a processing gas into the processing chamber, the gas jetting surface facing toward an inside of the processing chamber; and a mounting table installed in the processing chamber to face toward the shower head structure, the method comprising the steps of:

restricting a head distance between the gas jetting surface and the mounting table and a gas jetting velocity from the gas jetting holes to be within an area in a plane coordinates system having the head distance as a horizontal axis and the gas jetting velocity as a vertical axis, the area being surrounded by a quadrilateral shape formed by straight lines connecting four points including a point where the gas jetting velocity is 32 m/sec and the head distance is 15 mm; a point where the gas jetting velocity is 67 m/sec and the head distance is 15 mm; a point where the gas jetting velocity is 40 m/sec and the head distance is 77 mm; and a point where the gas jetting velocity is 113 m/sec and the head distance is 77 mm;

loading the object to be processed on the mounting table; and

introducing the processing gas through the gas jetting holes into the processing chamber.

8. The method of claim 7, wherein the processing gas contains ozone for reforming a metal oxide film formed on a surface of the object to be processed.

9. The method of claim 8, wherein the metal oxide film is a tantalum oxide film.